(54) Title: SYSTEM AND METHOD FOR THE PROVISION OF SERVICES OVER DIFFERENT NETWORKS
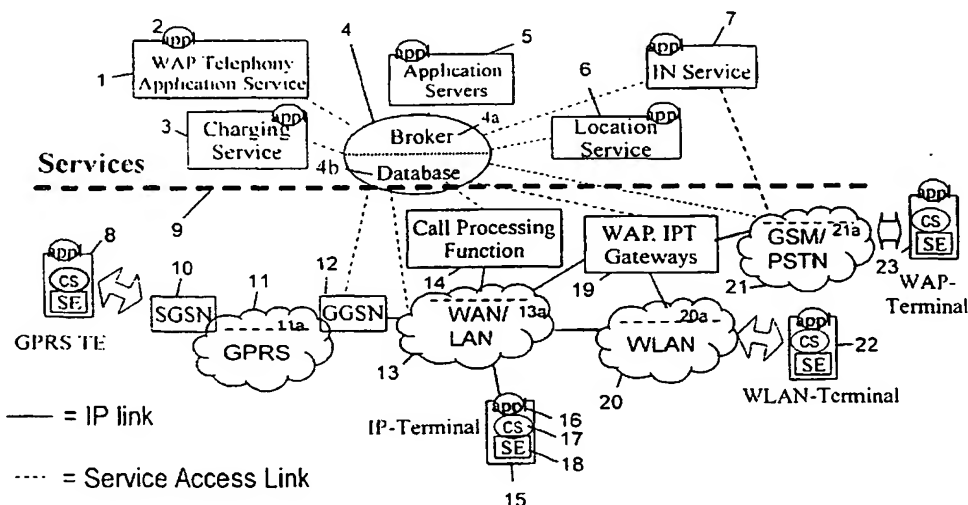
(57) Abstract: The invention provides a communication system comprising at least one terminal network element which can be connected to other network element(s) located in the same or another network. The system is adapted to allow an activation of at least one service, e.g. location service, for the at least one terminal network element, the service being executable based on service logic. The terminal network element(s) comprises or implements a standardised terminal environment for executing at least part of the service logic. Further, a standardised network application programming interface is provided for accessing at least one of the services. A broker cooperates with or has access to the standardised network application programming interface and the services. Thus, an infrastructure is provided which enables services to roam with a user. The customers can therefore roam from one network to another network (hybrid network) and will still keep the same services across these different networks.

For two-letter codes and other abbreviations, refer to the "Guid-ance Notes on Codes and Abbreviations" appearing at the begin-ning of each regular issue of the PCT Gazette.

TITLE OF THE INVENTION

SYSTEM AND METHOD FOR THE PROVISION OF SERVICES OVER DIFFERENT NETWORKS

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FIELD OF THE INVENTION

The invention relates to a communication system and method,
10   and in particular refers to the provision of services such as
communication services.over two or more different networks.

BACKGROUND OF THE INVENTION
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Networks such as communication networks allowing a
bidirectional communication, or data networks such as the
Internet, are usually adapted to provide one or more services
to the subscribers. These services are sometimes termed
20   "communication services" and provide end user services
including traditional telecommunication services like "Call
Forwarding to another Destination" (such as another phone
number or address), "Call Waiting", "Call Transfer", etc., and
more recent services e.g. providing a messaging function such
25   as multimedia instant messaging MMS (Multimedia Messaging
Service), short message service (SMS), mail, call presentation
service and all other services in that or other categories.

As a further service example, a location service (LS) may be
30   provided which represents a function for locating a VoIP user
(VoIP stands for Voice over IP-based networks such as the
Internet, or more general voice information transmission over
packet-based networks).

35   Actual services are targeted to and adapted for particular

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networks. Services of the first generation such as ISDN
supplementary services have at least partially been replaced
by second generation solutions such as Intelligent Network
(IN) based services. Networks of the third generation (3G) are
5   likewise adapted to provide services of similar kind.

Generally, one of the requirements of actual and future
networks is the possibility to enable customers to roam from
one network to another network (termed „hybrid network"
10   comprising two or more networks of different kind).

Another topic of interest is the further development of the
transmission of Voice over packet based networks such as VoIP
(Voice over IP-based networks, such as Internet). One of the
15   VoIP protocols is Session Initiation Protocol (SIP).

In the following, packet-based networks the abbreviated as
PBN. Such packet-based networks can be of different nature and
include GSM-based networks, GPRS (General Packet Radio
20   Service), WCDMA (Wideband Code Division Multiple Access), Blue
Tooth, WLAN (Wireless LAN, Wireless Local Area Network),
etc.). Actual services are limited to a specific type of
network. The development of terminals enable an end user to
roam between different PBN-types. The end user may e.g. be
25   connected to a Blue Tooth system at home, a GPRS based network
on the way to work, and to a WLAN at work. The user will
normally be provided with different services when roaming from
one network to another.

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SUMMARY OF THE INVENTION

The invention provides a system and method which enable a user
to be provided with one or more services which are maintained
35   even when roaming to different networks. The services operate

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over hybrid network and follow a user when roaming. Hence, the
users will be provided with activated services even across
network boundaries, and do experience the advantage of always
being provided with a selected service even when roaming to

5   another network or when changing the terminal network element
which may be a terminal equipment such as a mobile phone, a
computer station such as a laptop, etc. The services are able
to cooperate, if necessary, with existing services such as
telecommunication services provided by intelligent networks so

10 as to insure to continuity of the offered service or services.

In accordance with an aspect of the invention, a communication
system is provided which comprises at least one terminal
network element which can be connected to other network

15 element(s) located in the same or another network. The system
is adapted to allow an activation of at least one service for
the at least one terminal network element, the service being
executable based on service logic. The terminal network
elements or at least one thereof, comprises or implements a

20 standardised terminal environment for executing at least part
of the service logic. One or more standardised network
application programming interfaces are provided for accessing
at least one of the services.

25 The communication system preferably comprises a broker such as
an object request broker cooperating with, or having access
to, the standardised network application programming interface
and the services. The standardised network application
programming interface is preferably provided in the

30 network(s), or between service providing elements and the
network(s). The broker may also be implemented by using SOAP
(Simple Object Access Protocol) and an advanced DNS (Domain
Name Service) such as Microsoft DEN.

35 One or more of the terminal network elements preferably are

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mobile network elements, IP terminal(s), WAP terminal (s) and/or WLAN terminal(s).

In a preferred embodiment, the standardised terminal
5   environment is a MExE or similar environment.

The network(s) preferably is/are packet-based network, e.g. a GPRS, UMTS, WAN, LAN, WLAN, GSM, WCDMA, and/or TDMA network.

10   The services may include a charging service, a location service, an IN (Intelligent Network) service, a WAP telephony application service, Discovery Service, Presence, Instant Messaging, and/or VoIP through SIP servers.

15   The invention furthermore provides a method to be performed in a communication system, as defined in the method claims.

Thus, in accordance with an aspect of an implementation of the invention, an infrastructure is provided which enables
20   services to roam with a user and furthermore to access existing telecommunication services.

The customers can therefore roam from one network to another network (hybrid network) and will still keep the same services
25   across these different networks.

The invention allows services to be offered across hybrid networks.

30   In accordance with preferred embodiments of the invention, one or more of the following features are provided:
         running the service logic on the terminal network element(s) such as end user terminals;
         providing a standard terminal environment to run the
35   service or services;

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providing a standard network interface so as to abstract
the different networks behind this standard network interface;

accessing existing services over a broker means such as a
standard object request broker (ORB).

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Further aspects, details and advantages of the invention will
be described in the following with reference to a preferred
embodiment shown in the drawing.

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BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 shows the basic structure of an embodiment of a system
according to the invention.

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DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE
INVENTION.

20   Fig. 1 shows an embodiment of a system in accordance with the
present invention. This embodiment may be implemented so as to
be provided in any type of network, in particular a packet
based network (PBN). A PBN is any medium, e.g. any shared,
switched or point-to-point medium, which provides peer-to-peer

25   connections or communications between two or more end points
using a packet based transport protocol. PBN includes mobile
networks using packet based technology.

Below, some abbreviations will be used which have the
30   following meaning. „GSM" stands for „Global System_for Mobile
Communication". „PSTN" means „Public Switched
Telecommunication Network". A "SGSN" is a serving GPRS support
node. A "GGSN" is a gateway GPRS support node. „SE" stands for
„Standard Environment" such as or comparable to the GPRS
35   standard MExE as defined by ETSI (European Telecommunications

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Standards Institute). „WAP" stands for „Wireless Application
Protocol" standardised by the WAP-forum. "UMTS" means
Universal Mobile Telecommunication System. WCDMA stands for
Wideband CDMA (Code Division Multiple Access). A "broker" may
5   for instance be any object request broker and means any
standard mechanism to communicate between applications. The
broker may have or be equivalent to a Corba (Common object
request broker architecture) structure. A „service" may
consist of an application or applet and its related content
10 and may be defined to be a function or set of functions
offered to a user by a service provider, network operator or
any other organisation. The service may be performed e.g. on a
mobile station implementing MExE or Web Security (i.e.
Sandbox), etc.).

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Fig. 1 illustrates an example of a system in accordance with
the invention. This embodiment is implemented in a hybrid
network, e.g. a network structure including several networks
of different types such as a GPRS network 11, a WAN/LAN (Wide
20 Area Network / Local Area Network) 13, a WLAN (Wireless Local
Area Network) 17, and a GSM/PSTN network 18. According to one
aspect of this embodiment, the users can roam between these
different network types. For instance, a user can roam from
the GPRS-based network 11 to the WLAN 17 or to network 18
25 (which may also be a WAP-based network) e.g. when travelling
or commuting. The user may also connect, e.g. at work, to the
WAN or LAN 13. When roaming between these networks of
different types, the user may always use the same user
equipment, provided same is adapted to connect to the
30 different networks. The user may alternatively or additionally
use different terminal equipments (terminal network elements),
e.g. depending on his/her actual location such as being at
home, at work, visiting a customer, travelling or the like.
For instance, one and the same user may have access to, and
35 use, a terminal equipment (TE) 8 adapted for GPRS network

(GPRS TE), a terminal equipment (IP-Terminal) 15 which may be
adapted for communication using the Internet protocol (IP), a
terminal equipment (WLAN-Terminal) 22 adapted for a WLAN
network, and/or a terminal equipment (WAP-Terminal) 23 being
5   implemented as a WAP terminal, e.g. as a terminal adapted for
communication using WAP (Wireless Application Protocol) and
thus enabling a WAP-based Internet access.

At least one user terminal equipment, preferably more than one
10 or even all terminal equipments provided for one or more
users, such as the terminal equipments 8, 15, 22 and 23, may
have a structure as shown in Fig. 1. As illustrated with
regard to terminal equipment 15 as an example, the terminals
preferably comprise a structure which includes an application
15 part 16 which provides the necessary interface and software
and/or hardware structure for communication with the
respective network, a layer CS 17 which provides Communication
Services (CS), and may be an Application or Service Logic, and
a standard environment SE 18.
20
The terminal equipments (terminal network elements) 8, 22 and
23 are connected by radio access to their associated networks
as illustrated by double headed arrows. The IP terminal 15 may
be connected to the network 13 via an IP link or other links
25 including radio access. In the drawing, IP links are
represented by a solid lines. Service access links are
represented by broken lines.

When the GPRS-based terminal equipment 8 transmits and/or
30 receives information such as user traffic or signalling
messages, it communicates with a support node 10 (SGSN) which
forms part of GPRS network 11. When the connection involves
one or more further networks such as networks 13, 20 or 21,
the connection is routed via a gateway node 12 (GGSN).
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The network 13 is equipped with, or has access to, a call
processing function 14 providing the necessary functionality
for properly processing and handling calls within network 13
or across boarders to other networks such as network 11, 20 or
5   21. Further, one or more gateways 19 are provided which may
WAP gateways or IPT (IP-terminal) gateways and provide the
gateway functions for connection handling to and from or
within networks such as networks 13, 20 and 21.

10   The networks in and for which the invention may be applied are
not restricted to the networks shown in Fig. 1. As an
alternative, or in addition to the networks shown in Fig. 1,
one or more WCDMA networks, one or more UMTS networks, and/or
networks of other types may be provided.
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The users (user equipment, i.e. terminal equipments) are
provided with several services which may be freely selectable,
such as call forwarding, or may be forcibly implemented such
as the charging service. Fig. 1 shows several different types
20   of services. According to Fig. 1, the services are shown above
a broken horizontal line 9 which symbolises that, in
accordance with a preferred structure of the invention, the
services are not implemented within the networks inaccessible
from the outside but are invoked according to need or options
25   in such a manner that the users do not recognise any
significant change, if at all, regarding the provided services
and service handling even when roaming and changing the
attached network and/or the used equipment (such as terminal
equipments 8, 15, 22, 23). Such services can be provided by
30   the network or by the terminal or by both the network(s) and
the terminal(s).

Fig. 1 shows some examples of services. In an actual
implementation of the invention, only some of the shown
35   services may be offered. As an alternative, all the services,

additional services or other services may be provided. The
invention intends to cover all these cases. According to the
embodiment shown in Fig. 1, there are provided a WAP telephony
application service 1 providing WAP connection for accessing
5   an IP-based network such as the Internet, a charging service 3
for properly calculating and assigning the charges of calls
connections, used services or other items. Further, one or
more application servers 5 are provided which are able to
perform services by running applications as provided by the
10   network operators, service providers or requested by users. In
addition, a location service 6 is implemented which is a
function to locate VoIP user(s). Moreover, an Intelligent
Network (IN) service 7 is provided which offers support for
handling connections when e.g. decisions are to be made. For
15   invoking desired services, application functions/programs such
as applets 2 are provided for each service, as shown in Fig. 1
in elliptical shapes. Further, VoIP may be implemented by SIP
and discovered with SIP mechanism.

20   In the embodiment shown in Fig. 1, a means 4 is provided which
comprises a broker 4a and a database 4b. The broker 4a and the
database 4b may be implemented in the same device having
broker functionality and sufficient storage capacity for
storing the database 4b. In an alternative embodiment, the
25   broker means 4a and the database 4b are implemented in
different devices which may be connected to each other via a
physical hardware link or temporary access links, etc. The
database 4b stores profiles for users which are allowed to
roam between the different networks such as shown in Figure 1.
30   The contents of database 4b essentially comprises two parts: a
first part describes the terminal properties of the terminal
equipments assigned to or accessible by certain or all users.
This part may store information on all terminal equipments
connectable to the networks. In this database part,
35   information on the types, properties, specifications (e.g.

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data rates) of the respective terminal equipments, the
capabilities thereof and other features such as identities,
e.g. SIM card entries, may be registered. Further, in a second
part of database 4b, services provided or selectable for the
5   respective users are registered. E.g., services actively
activated by a user, or services forcibly provided for the
users such as charging service 3, are marked, in the database,
as active services. When a user roams, i.e. attaches, to
another network, or starts to use another terminal equipment,
10   the database 4b is checked by this another network or some
other function, or by the network to which the newly used
equipment starts the attachment process, for retrieving
information on activated services. When such activated
service(s) is found, this service(s) is invoked, or
15   maintained, also for this new network and/or newly used
terminal equipment.

The broker 4a may be implemented as an object request broker
(ORB) which may have a CORBA structure, or as a SOAP/DEN
20   implementation. CORBA stands for "Common Object Request Broker
Architecture" such as specified by the Object Management Group
(OMG). CORBA addresses interoperability in distributed
heterogeneous environments, and can be conceptualized as a
communication bus for client-server objects. CORBA is a three-
25   tier distributed object mechanism so that the terminology
"client-server" applies within the context of a specific
request. If one of the networks 11, 13, 20, 21 invokes a
service from the service devices or functions 1, 3, 5, 6
and/or 7, the network can be termed client, and the service
30   providing device or function can be termed server. Exported
server interfaces can be specified in a CORBA standard
interface definition language (IDL). As such a CORBA structure
is known to the skilled man, no further description details
are necessary. The broker 4a can have such a CORBA structure,
35   or can be implemented in any other suitable manner which

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ensures that a requested service is appropriately invoked and
provided.

The broker may also be implemented by e.g. using SOAP (Simple
5   Object Access Protocol) and an advanced DNS (Domain Name
Service) such as Microsoft DEN.

Figure 1 shows a global view of the provision of services
(e.g. communication services) over a hybrid network structure.
10   Further details of the structure and of the method of
functioning and operation of the embodiment will be described
below. Generally, the service or services presently activated
for one or more users (e.g. subscribers to a specific network
or visiting users only temporarily present in a network) will
15   be provided over the hybrid network structure when roaming
across different network. Services will either be transferred
or are resident on one or more terminal equipments (network
elements) used by the user(s) and access the network
functionality through a standard interface in a preferably
20   secure environment. However, the services may also at least be
partly provided by the network to which a user is presently
attached when e.g. the terminal resources often the terminal
equipment should not be sufficient for instance for voice
recognition, or when the implementation of the activated
25   service or services is better implemented within the network,
or when e.g. network legacy resources, e.g. for lawful
interception or the like, have to be accessed. The combination
of network-based services accessed through a standard
application programming interface (API), and terminal-based
30   services run in a standard environment (SE 18), and the
cooperation of these functionalities allows the stable and
reliable provision of services over hybrid networks. Any
roaming user will therefore be provided with the presently
activated services in a reliable manner even when roaming
35   between networks of different types.

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When services run on the end user terminal equipment such as
network element 8, 15, 22 or 23, the standard environment (SE)
18 provided in and by the terminal equipments allows the
5   services to act in a standardized way. The standard
environment 18 takes care of security matters and defines a
standard API (Application Programming Interface) toward the
network (e.g. charging, call processing, messaging etc.). Such
a standard environment 18 may be, in a GPRS environment, e.g.
10 terminal equipment 8 and network 11, the standard environment
called MExE (Mobile Station Application Execution
Environment). Such a standard environment of MExE or other
type is extended, i.e. implemented, in the terminal equipments
15, 22, 23 etc. attributed to the users, that is to all
15 terminals on the packet based networks (PBN) which the user
may use. This ensures that a standard and stable environment
exists on all the terminals to which the user or users may
have access. Therefore, services are able to flow freely
between terminals of different nature because of the standard
20 environment implemented in these terminals.

When the service or services completely or at least partially
run on the network or networks like e.g. IN based legacy
service or charging service, these services can be accessed
25 through a standard API with the help of the broker 4a. The
standard network API is indicated, in Figure 1, by the broken
line 9 on a superordinate level. In detail, each network will
implement, or have access to, such a standard network API.
This standard network API is represented by a broken line
30 within each network which standard API has an "a" attached to
the reference numeral of the associated network (standard API
11a for network 11, standard API 13a for network 13, standard
API 20a for network 20, and standard API 21a for network 21).
This network API 11a, 13a, 20a, 21a is standardized for each
35 network so that the broker 4a has to communicate with only one

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one standard interface type independent of the network
actually provided behind this standardized API. This
configuration contributes to open up traditional
telecommunication networks and renders available at least one,

5   several or all network-based services in a standardized way.

In the present embodiment, the terminal services described
above such as the standard environment, are combined with the
standard network API 11a, 13a, 20a, 21a so as to build a

10   strong environment for rendering available services in a
reliable manner across·networks and terminals.

With regard to the standard network API, a network API may be
used as defined e.g. by the Parlay organization.

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Instead of providing a standard network API 11a, 13a, 20a, 21a
in each network, the networks as such may also remain
basically unchanged in their structure, and the application
programming interface 9 may provide the necessary standardized

20   interface function. In this case, a gateway may be provided
which is able to communicate with each of the network of the
hybrid network structure (here: networks 11, 13, 20, 21) and
which communicates with the standard application programming
interface 9 so as to provide the connections between the

25   networks and the broker 4a.

Although the invention has been described above with reference
to preferred embodiments, modifications, amendments or
additions are likewise included in the scope of the invention.

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CLAIMS

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1. Communication system comprising at least one terminal network element which can be connected to other network element(s) located in the same or another network, wherein

10   the system is adapted to allow an activation of at least one service for the at least one terminal network element, the service being executable based on service logic,

the terminal network element, or, in case of several terminal network elements, at least one thereof, comprises or

15   implements a standardised terminal environment for executing at least part of the service logic, and

a standardised network application programming interface is provided for accessing at least one of the services.

20   2. Communication system according to claim 1, comprising a broker cooperating with, or having access to, the standardised network application programming interface and the services.

25   3. Communication system according to claim 2, wherein the broker is an object request broker.

4. Communication system according to any one of the preceding claims, wherein the standardised network application

30   programming interface is provided in the network(s), or between service providing elements and the network(s).

5. Communication system according to any one of the preceding claims, wherein at least one of the terminal network

35   elements is a mobile network element.

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6. Communication system according to any one of the preceding claims, wherein at least one of the terminal network elements is an IP terminal, a WAP terminal and/or a WLAN terminal.

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7. Communication system according to any one of the preceding claims, wherein the standardised terminal environment is a MExE or similar environment.

10   8. Communication system according to any one of the preceding claims, wherein the network(s) is/are a packet-based network.

9. Communication system according to any one of the preceding claims, wherein the network(s) is/are a GPRS, UMTS,
15   WAN, LAN, WLAN, GSM, WCDMA, and/or TDMA network.

10. Communication system according to any one of the preceding claims, wherein the at least one service is a
20   charging service, a location service, an IN (Intelligent Network) service, and/or a WAP telephony application service.

11. Method to be preformed in a communication system, preferably in a communication system according to any one of
25   the preceding claims, which comprises at least one terminal network element which can be connected to other network element(s) located in the same or another network, wherein
        at least one service for the at least one terminal
30   network element can be activated and executed based on service logic,
        the terminal network element, or, in case of several terminal network elements, at least one thereof, comprises or implements a standardised terminal environment for executing
35   at least part of the service logic, and

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at least one of the services is accessed via a standardised network application programming interface.

12. Method according to claim 11, whrein a broker
5 cooperates with, or has access to, the standardised network application programming interface and the services.

13. Method according to claim 11 or 12, wherein the standardised network application programming interface is
10 provided in the network(s), or between service providing elements and the network(s).

14. Method according to any one of claims 11 to 13, wherein at least one of the terminal network elements is a
15 mobile network element, and/or wherein at least one of the terminal network elements is an IP terminal, a WAP terminal and/or a WLAN terminal.

15. Method according to any one of claims 11 to 14,
20 wherein the standardised terminal environment is a MExE or similar environment.

16. Method according to any one of claims 11 to 15, wherein the network(s) is/are a packet-based network.
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17. Method according to any one of claims 11 to 16, wherein the network(s) is/are a GPRS, UMTS, WAN, LAN, WLAN, GSM, WCDMA, and/or TDMA network.

30   18. Method according to any one of claims 11 to 17, wherein the at least one service is a charging service, a location service, an IN (Intelligent Network) service, and/or a WAP telephony application service.
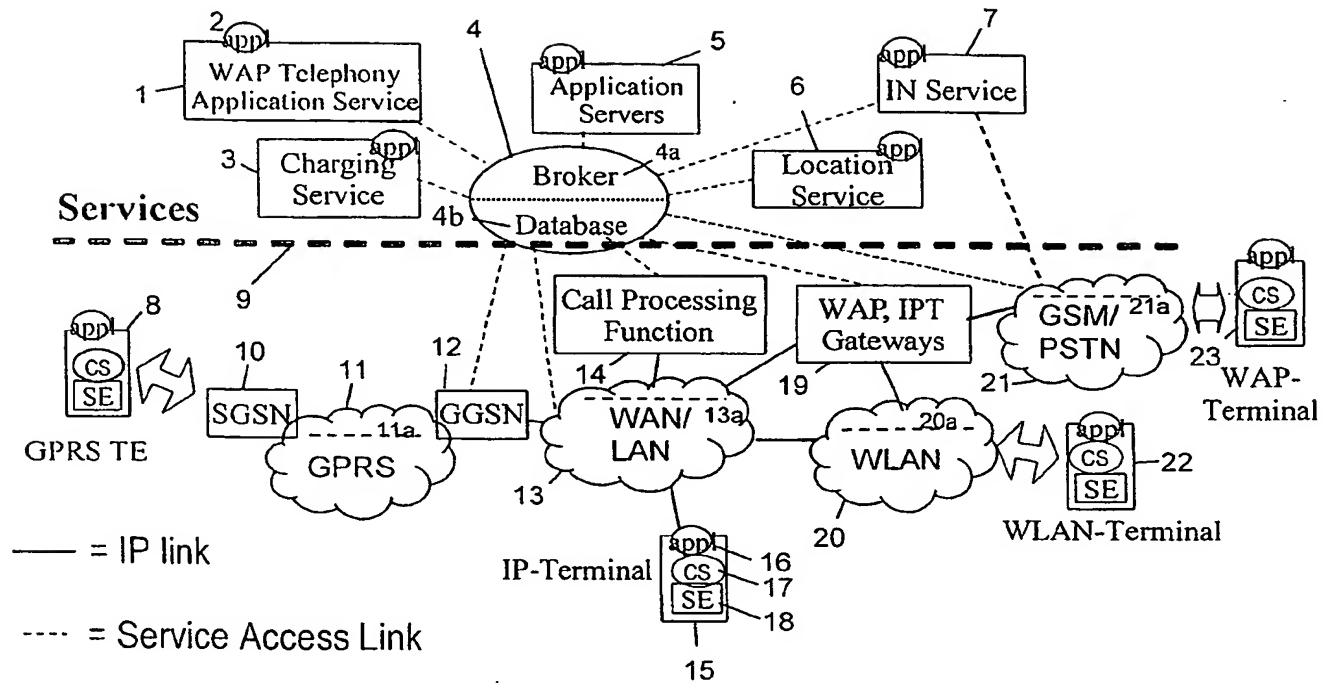
16

Fig. 1

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 42760 A (ERICSSON TELEFON AB L M) 20 July 2000 (2000-07-20) abstract page 4, line 14 –page 5, line 2 page 5, line 24 –page 6, line 4 page 8, line 6 –page 9, line 15 page 12, line 19 – line 22 page 38, line 3 – line 7; claims 16,19 -----	1-6, 8-14, 16-18

[ ] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 June 2001	13/06/2001

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INTERNATIONAL SEARCH REPORT

In   nal Application No

PCT/EP 00/08009

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 0042760	A	20-07-2000	AU	2334400 A	01-08-2000
			AU	2334500 A	01-08-2000
			WO	0041499 A	20-07-2000

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